ABSTRACT OF THE DISCLOSURE

A high power narrow band, high repetition rate laser light source optical improvement apparatus and methods are disclosed which may comprise a fast moving angularly positionable tuning mirror comprising: a mirror mounting frame comprising a first material and a relatively flat mounting surface area; a reflective optic comprising a second material having a coefficient of thermal expansion different from that of the first material of the mounting frame; at least two attachment points of attachment between the mounting frame and the reflective optic on the mounting frame surface; and, at least one flexure mount formed in the mounting frame that is flexible in a flexure axis corresponding to a longitudinal axis of thermal expansion of the mounting frame and the reflective optic, positioned at one of the at least two points of attachment. The flexure mount may comprise: a flexure body formed from the material of the mirror mounting frame and separated from the material of the mirror mounting frame to allow relative movement between the flexure and the mirror mounting frame; at least one flexure arm formed from the material of the mirror mounting frame and attached at one end to the mirror mounting frame and at the other end to the flexure. The apparatus and method may further comprise a flexure force mechanism made of the second material or a third material having a coefficient of thermal expansion that is essentially the same as that of the second material; the flexure force mechanism comprising an elongated rod; a flexure force mechanism slot generally aligned with the flexure axis and sized to snuggly fit the flexure force mechanism between a slot wall at one end of the flexure force mechanism slot and the flexure body at the other end of the flexure force mechanism slot. The force mechanism may pre-stress the flexure. The mirror may be a grating. The grating may have a metallic reflective surface and a protective coating over the reflective coating comprising a dense glassy material that is essentially non-porous to undesired contaminants exposure of which to the reflective coating is desired to be prevented, which may comprise an amorphous silica, a doped amorphous silica, which may be halide doped and the halide may be fluorine. The grating may be actively tuned using an electro- or magneto-sensitive element. Oxides of the metal in the reflective layer may be removed by a hydrogen purge.

Exposed optical sealing members sensitive to DUV light may be shielded by an annular protection shield placed on the optic.